US009211596B2

(12) **United States Patent**
Hecht

(10) **Patent No.: US 9,211,596 B2**
(45) **Date of Patent: Dec. 15, 2015**

(54) **DETACHABLE CUTTING TOOL SEGMENT WITH RESILIENT CLAMPING AND CUTTING TOOL THEREFOR**

(71) Applicant: **Iscar, Ltd.**, Tefen (IL)

(72) Inventor: **Gil Hecht**, Nahariya (IL)

(73) Assignee: **Iscar, Ltd.**, Tefen (IL)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 261 days.

(21) Appl. No.: **14/010,270**

(22) Filed: **Aug. 26, 2013**

(65) **Prior Publication Data**

US 2015/0056026 A1 Feb. 26, 2015

(51) **Int. Cl.**

B23B 27/04	(2006.01)
B23C 5/22	(2006.01)
B23C 5/08	(2006.01)

(52) **U.S. Cl.**

CPC ... ***B23C 5/22*** (2013.01); ***B23C 5/08*** (2013.01); *B23C 2210/161* (2013.01); *B23C 2210/168* (2013.01); *B23C 2260/52* (2013.01); *Y10T 407/1934* (2015.01); *Y10T 407/2282* (2015.01); *Y10T 407/2286* (2015.01); *Y10T 407/2288* (2015.01); *Y10T 407/25* (2015.01)

(58) **Field of Classification Search**

CPC B23B 27/04; B23B 27/16; B23B 27/1625; B23B 27/164; B23B 27/1666; B23B 29/043; B23B 29/06; B23B 29/14; B23B 2220/12; Y10T 407/193; Y10T 407/1932; Y10T 407/194

USPC 407/72, 91, 102, 104, 107, 109, 110, 407/111, 113, 117; 81/177.85

See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

207,003	A	8/1878	Berry	
341,187	A	5/1886	Timmons	
1,434,629	A	11/1922	Petzold	
2,860,863	A	11/1958	Bruestle et al.	
3,887,975	A	6/1975	Sorice et al.	
4,363,576	A *	12/1982	Zweekly	407/50

(Continued)

FOREIGN PATENT DOCUMENTS

DE	3119834	A1 *	12/1982
DE	85 13 350.7		5/1985

(Continued)

OTHER PUBLICATIONS

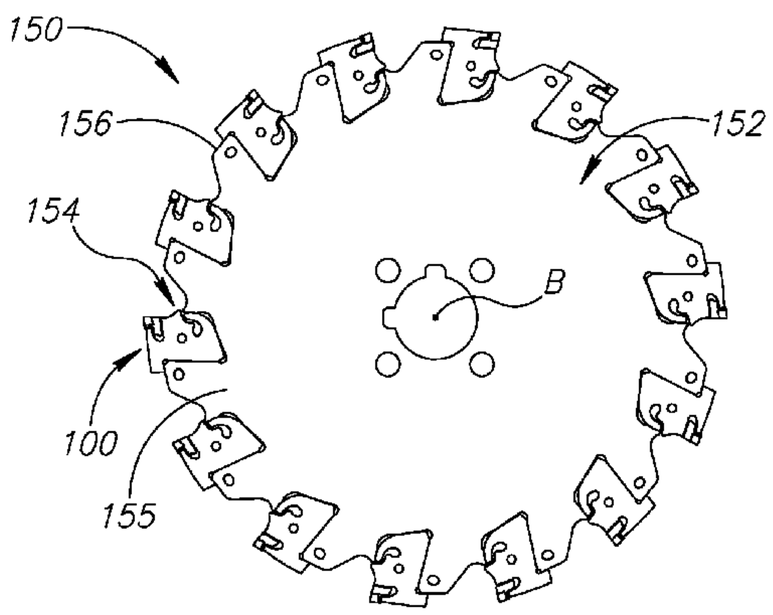
International Search Report dated Oct. 28,2014 issued in PCT counterpart application (No. PCT/IL2014/050564).

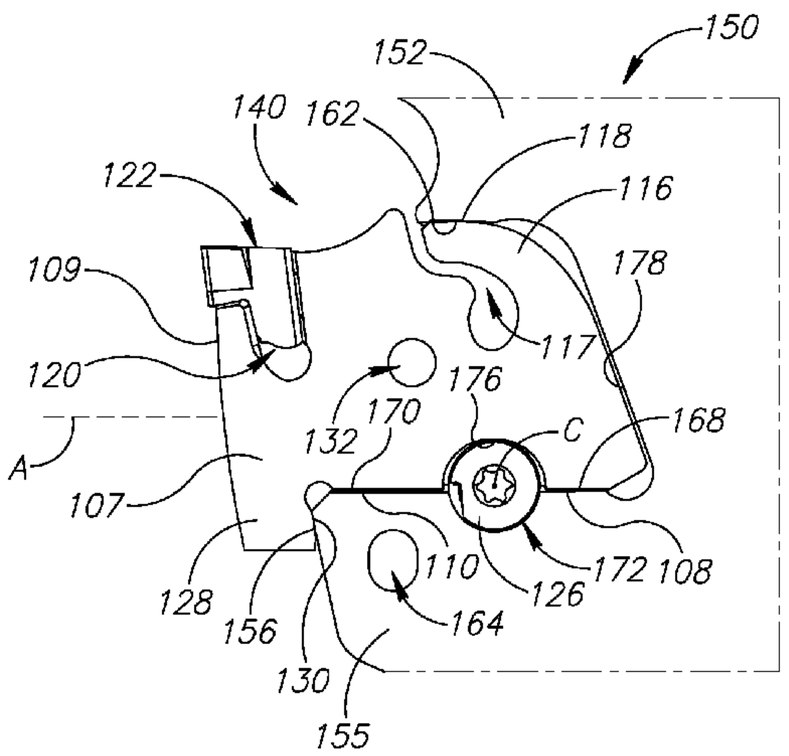
Primary Examiner — Daniel Howell
Assistant Examiner — Nicole N Ramos
(74) *Attorney, Agent, or Firm* — Womble Carlyle Sandridge & Rice PLLC

(57) **ABSTRACT**

A cutting tool having at least one segment pocket formed at a peripheral surface thereof, and respectively, at least one cutting tool segment, detachably mounted in each segment pocket. Each cutting tool segment has a longitudinal segment axis extending in a rearward to forward direction, and upper and lower ends, located on opposite sides of the segment axis. The lower end has two spaced apart lower abutment surfaces. An insert retention portion is formed in the upper end, at a forward end of the cutting tool segment. A resilient retention arm is formed in the upper end, rearwardly spaced apart from the insert retention portion. The retention arm has an upper abutment surface. In a side view of the cutting tool segment, the upper and lower abutment surfaces are linear.

15 Claims, 4 Drawing Sheets





(56) **References Cited**

U.S. PATENT DOCUMENTS

4,492,140	A	1/1985	Pano	
4,604,004	A	8/1986	Armbrust	
4,898,054	A	2/1990	Byström et al.	
4,936,516	A *	6/1990	Hench	241/294
4,938,641	A	7/1990	Maier	
5,829,423	A	11/1998	Benz	
5,833,403	A *	11/1998	Barazani	407/101
6,325,574	B1	12/2001	Treige	
6,971,823	B2 *	12/2005	Satran et al.	407/46
7,090,443	B2	8/2006	Hecht et al.	
7,163,361	B2	1/2007	Hecht	
2002/0176754	A1 *	11/2002	Barazani	407/42
2004/0161311	A1	8/2004	Satran et al.	
2004/0191008	A1 *	9/2004	Noggle et al.	407/46
2007/0127992	A1	6/2007	Spichtinger et al.	
2009/0290944	A1	11/2009	Gamble et al.	
2010/0254773	A1	10/2010	Hecht	

FOREIGN PATENT DOCUMENTS

DE	4400538	A1 *	7/1995
DE	100 10 223		9/2001
EP	1384543	A1 *	1/2004
SU	1227810		4/1986

* cited by examiner

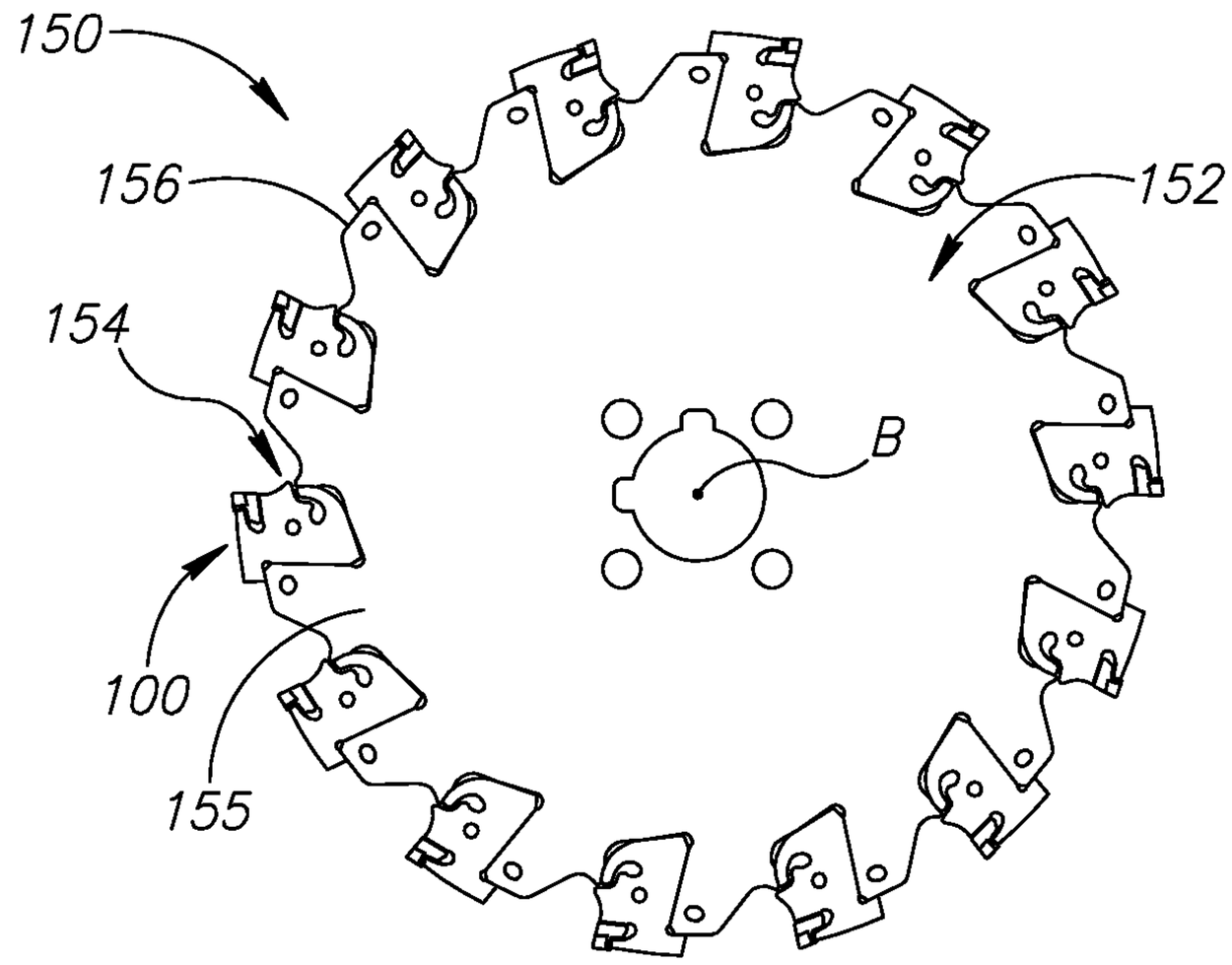

150
156
152
154
B
100
155

FIG.1

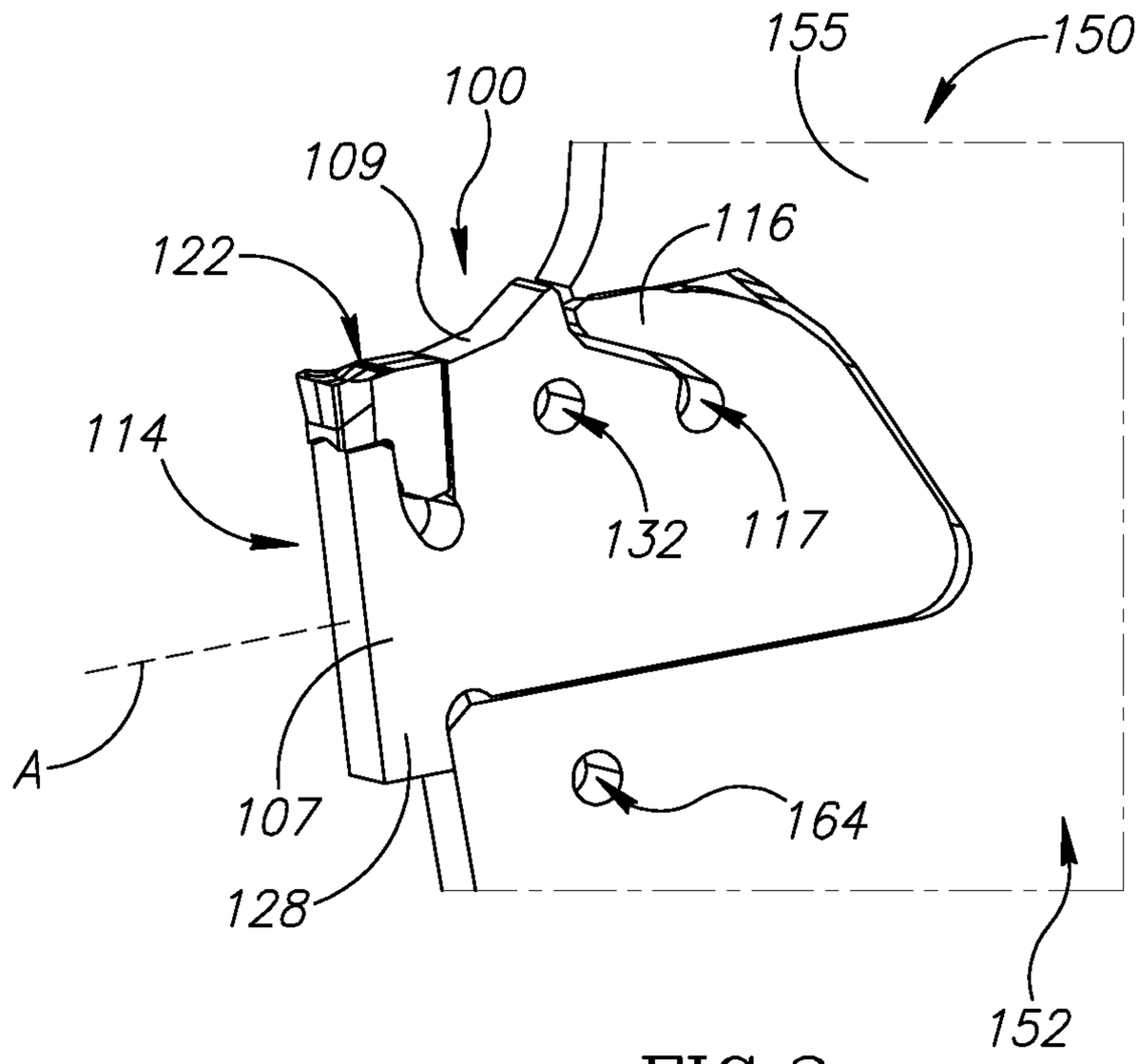

155
150
100
109
116
122
114
132
117
A
107
128
164
152

FIG.2

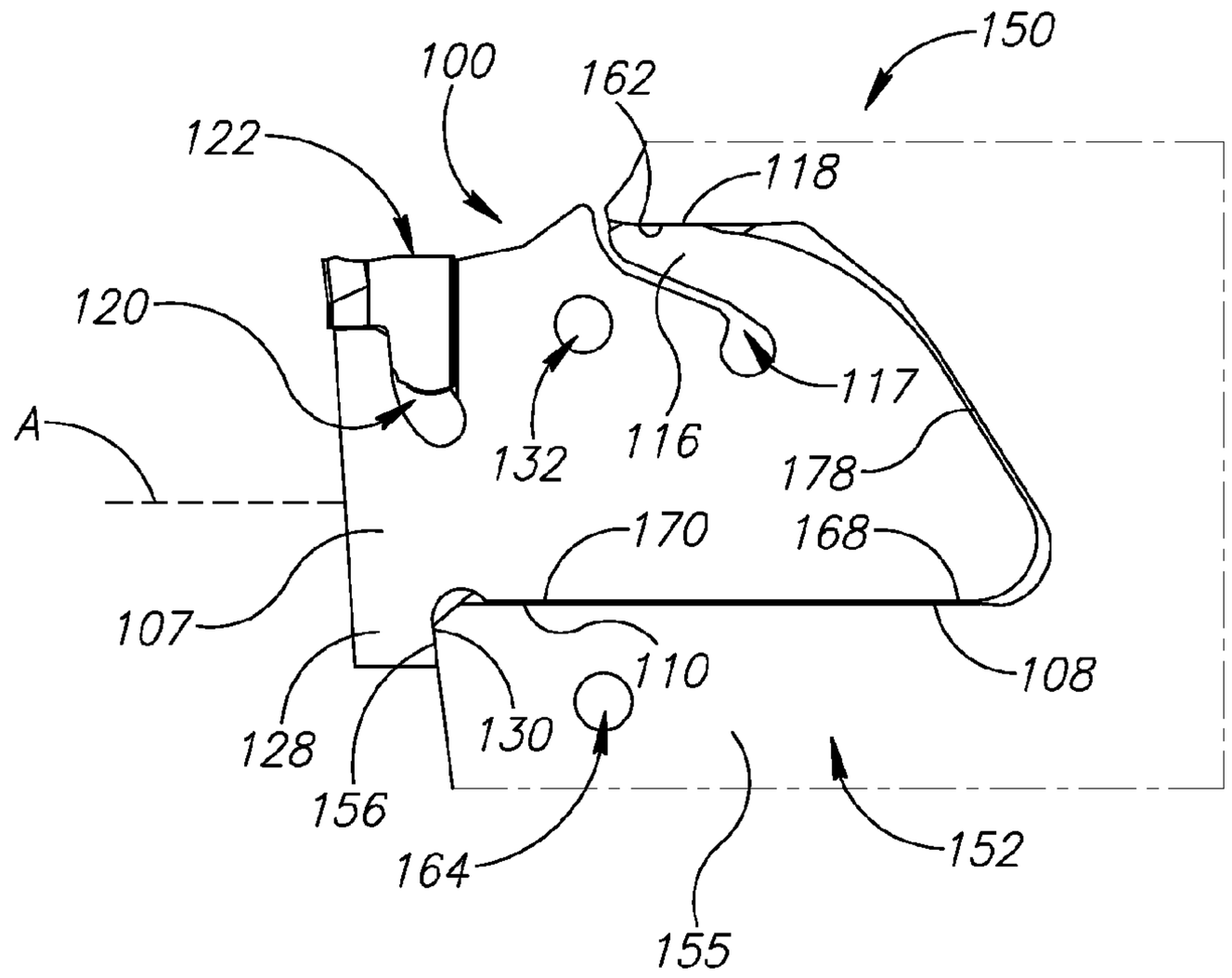

150
100
162
122
118
120
117
A
132
116
178
170
168
107
110
108
128
130
156
164
152
155

FIG.3

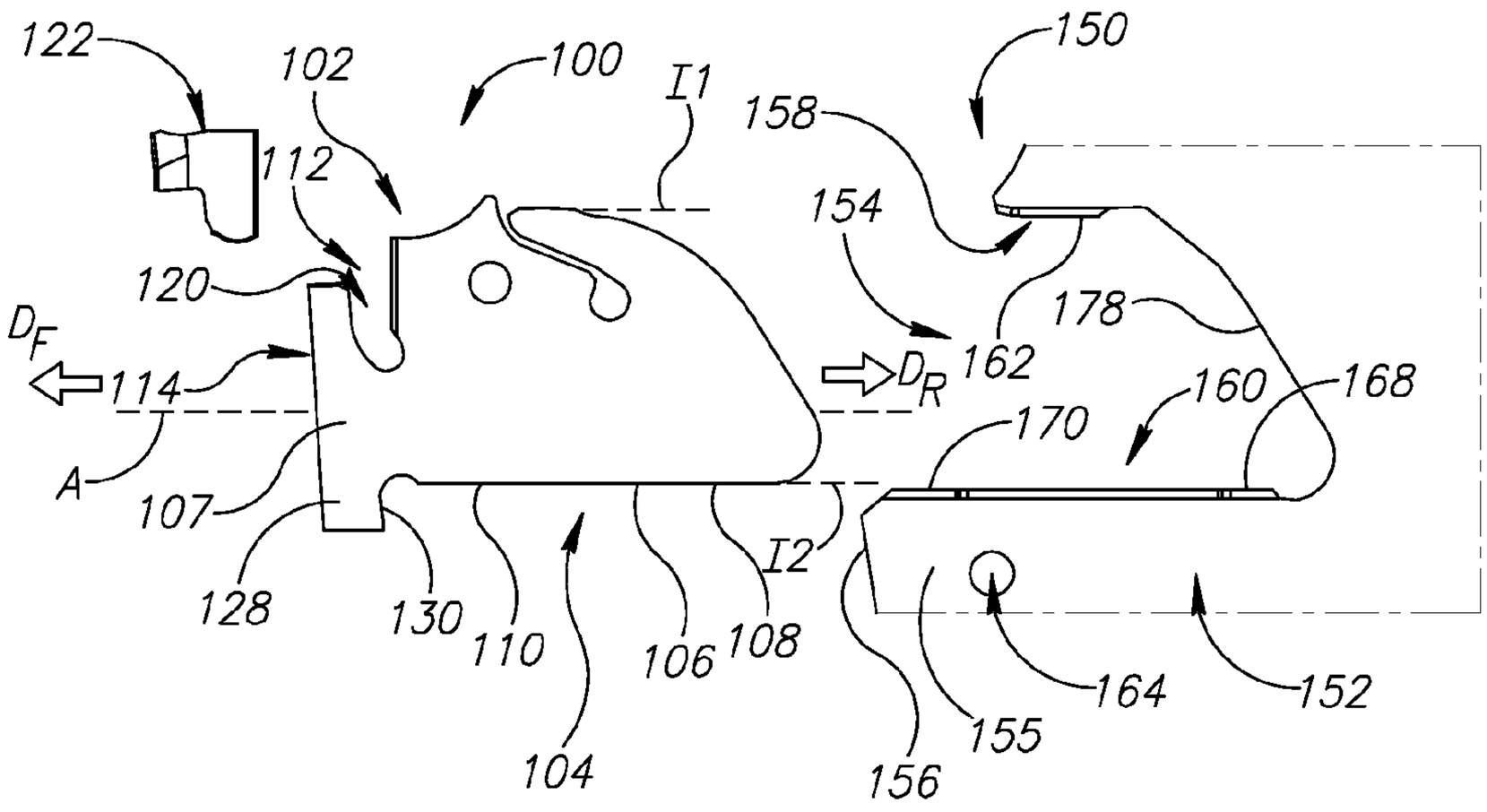

122
102
100
I1
158
150
112
154
120
178
D_F
162
D_R
160
168
114
170
A
107
I2
128
130
110
106
108
164
152
104
155
156

FIG.4

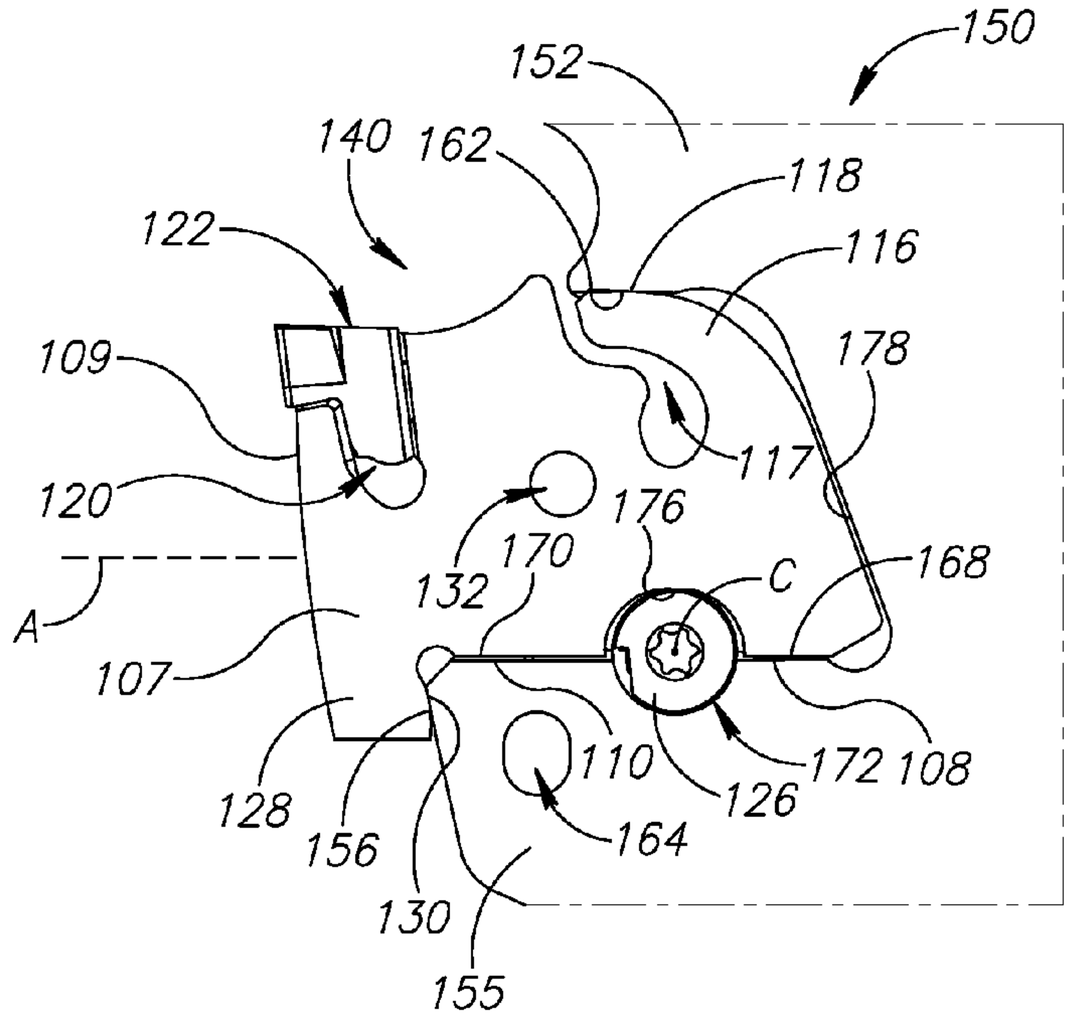

150
152
140
162
118
122
116
109
178
117
120
176
170
168
132
C
A
107
110
172
108
128
156
126
164
130
155

FIG.5

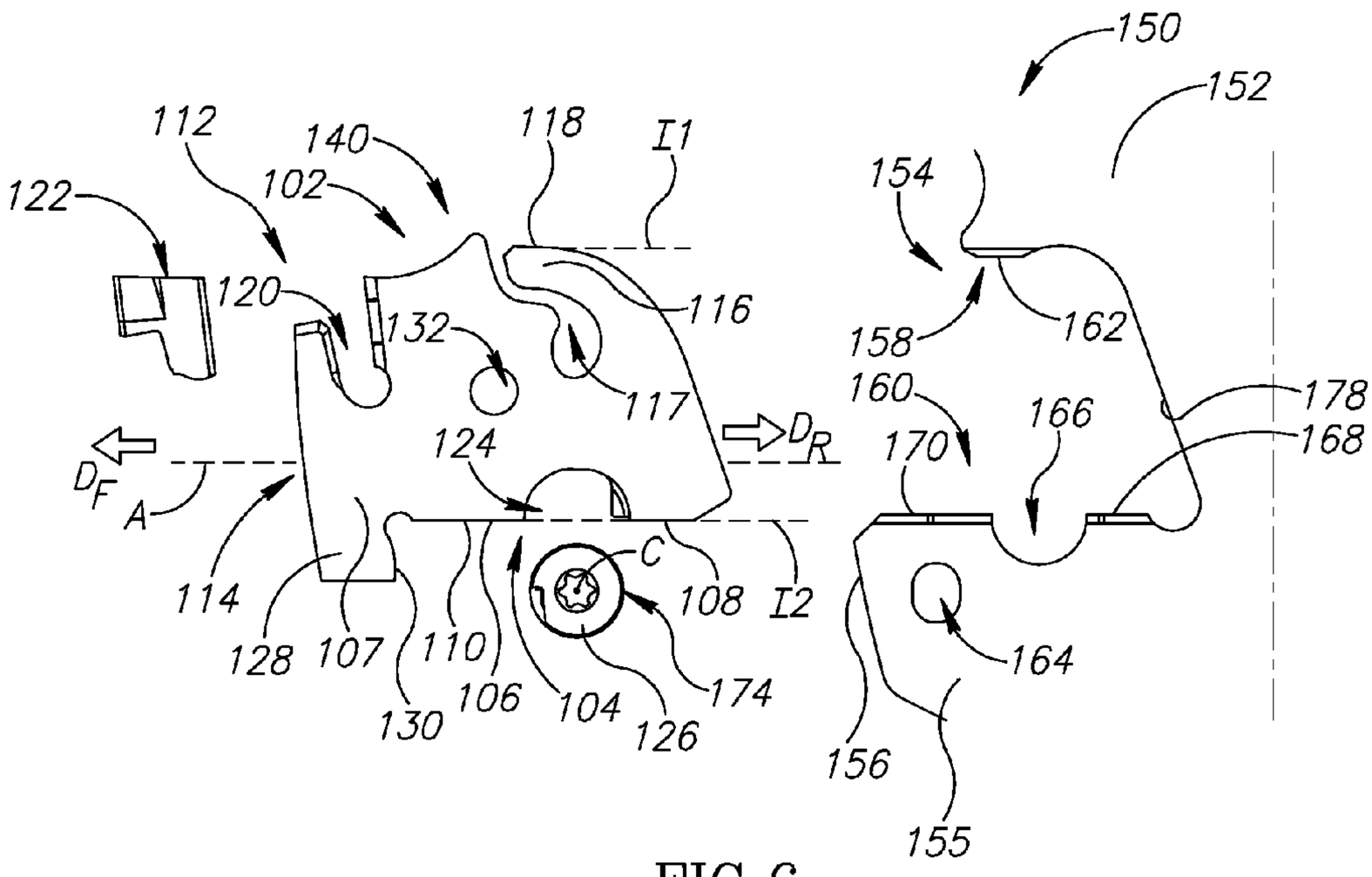

150
152
112
140
118
I1
154
122
102
120
116
158
162
132
160
178
117
166
168
124
D_R
170
D_F
I
A
C
114
108
I2
128
107
110
106
104
174
164
130
126
156
155

FIG.6

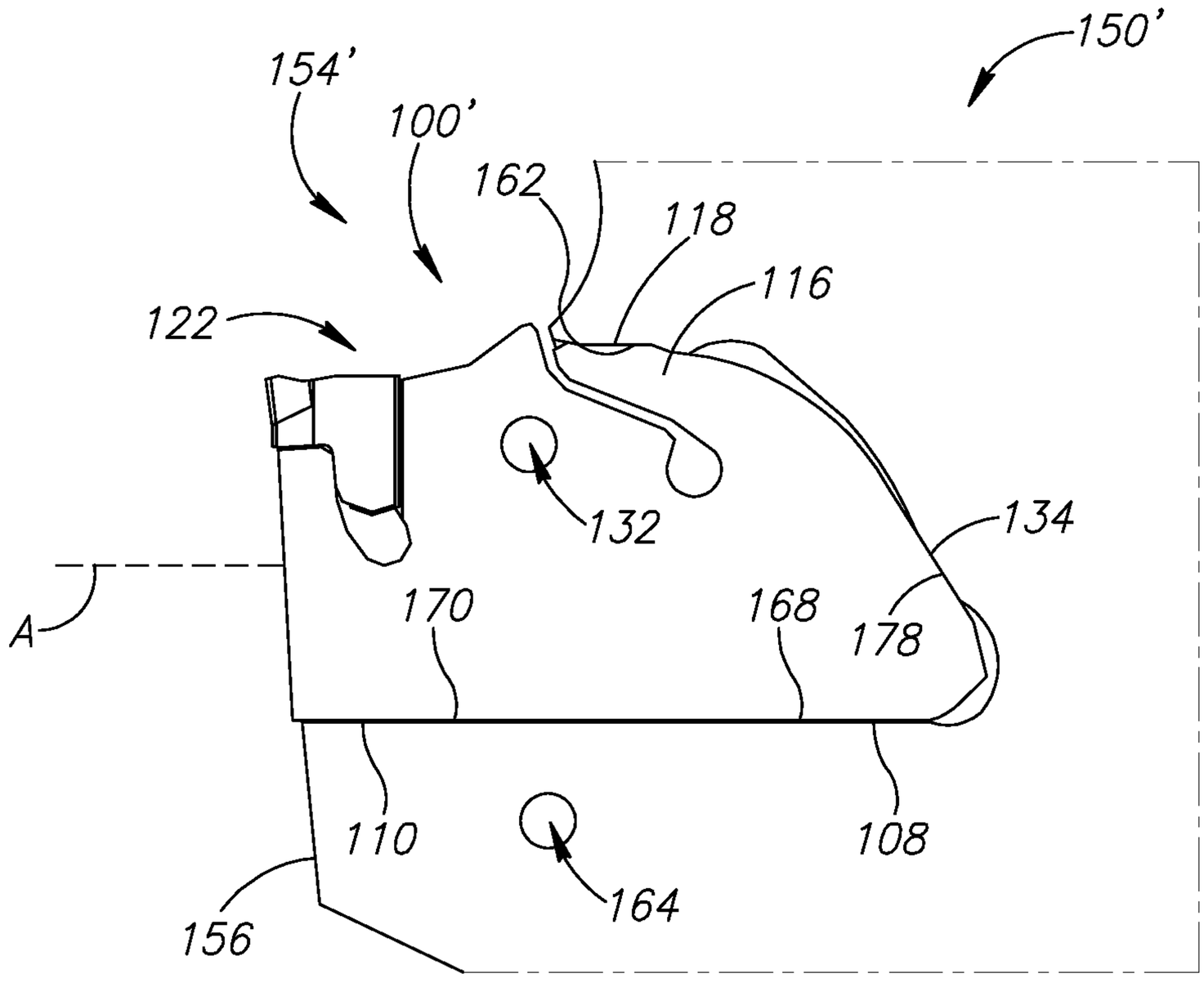


FIG.7

DETACHABLE CUTTING TOOL SEGMENT WITH RESILIENT CLAMPING AND CUTTING TOOL THEREFOR

FIELD OF THE INVENTION

The present invention relates to cutting tools having cutting inserts retained circumferentially thereon, in general, and to such cutting tools with detachable segments retaining the cutting inserts, in particular.

BACKGROUND OF THE INVENTION

Cutting tools such as slotting cutters and saws have a plurality of cutting inserts retained at their peripheral surface. The cutting inserts may be retained in cutting tool elements, which are separable from the tool holder body. Such cutting tool elements are known to be coupled with the tool holder body in various forms. Some cutting inserts or cutting tool elements are retained in a respective pocket or recess, by a cam maintaining their location.

Cutting tools with cutting tool segments or cutting inserts as described above, are shown, for example, in the following US patent publications: U.S. Pat. Nos. 4,604,004, 4,898,054, 6,325,574, 4,492,140, 3,887,975, 2,860,863, 341,187 and 207,003, as well as in German patent publications DE8513350U1and DE10010223B4.

It is an object of the subject matter of the present application to provide an improved novel cutting tool segment, which is resiliently retained in the tool holder body, and detachable therefrom, regardless of the retaining of the cutting insert in the cutting tool segment.

SUMMARY OF THE INVENTION

In accordance with the subject matter of the present application, there is provided a cutting tool segment having a longitudinal segment axis extending in a rearward to forward direction, and comprising:

an upper end and a lower end, located on opposite sides of the segment axis, the lower end having two spaced apart lower abutment surfaces,

an insert retention portion formed in the upper end, at a forward end of the cutting tool segment; and

a resilient retention arm formed in the upper end, rearwardly spaced apart from the insert retention portion, the retention arm having an upper abutment surface;

wherein in a side view of the cutting tool segment, the upper and lower abutment surfaces are linear.

In accordance with the subject matter of the present application, there is provided a cutting tool, comprising: a tool holder body having at least one segment pocket formed at a peripheral surface thereof, and at least one cutting tool segment as described above retained in the at least one segment pocket.

In the cutting tool's tool holder body, each segment pocket has an upper pocket surface and an opposite lower pocket surface, the upper pocket surface having an upper clamping surface and the lower pocket surface having two spaced apart lower clamping surfaces; the upper abutment surface of the cutting tool segment abuts the upper clamping surface of the segment pocket, the lower abutment surfaces of the cutting tool segment abuts the lower clamping surfaces of the segment pocket, and the retention arm is resiliently forced toward the segment axis. At least one cutting insert is retained in the insert retention portion of the at least one cutting tool segment.

BRIEF DESCRIPTION OF THE DRAWINGS

For a better understanding of the present invention and to show how the same may be carried out in practice, reference will now be made to the accompanying drawings, in which:

FIG. **1** is a schematic illustration side view of a cutting tool according to an embodiment of the present invention;

FIG. **2** is a perspective view of a portion of the cutting tool of FIG. **1**;

FIG. **3** is a side view of the portion of the cutting tool of FIG. **2**;

FIG. **4** is an exploded side view of the portion of the cutting tool of FIG. **2**;

FIG. **5** is a side view of a portion of a cutting tool in accordance with another embodiment of the present invention;

FIG. **6** is an exploded side view of the portion of the cutting tool of FIG. **5**; and

FIG. **7** is a side view of a portion of a cutting tool, according to a further embodiment of the present invention.

It will be appreciated that for simplicity and clarity of illustration, elements shown in the figures have not necessarily been drawn to scale. For example, the dimensions of some of the elements may be exaggerated relative to other elements for clarity, or several physical components may be included in one functional block or element. Further, where considered appropriate, reference numerals may be repeated among the figures to indicate corresponding or analogous elements.

DETAILED DESCRIPTION OF THE INVENTION

In the following description, various aspects of the present invention will be described. For purposes of explanation, specific configurations and details are set forth in order to provide a thorough understanding of the present invention. However, it will also be apparent to one skilled in the art that the present invention may be practiced without the specific details presented herein. Furthermore, well-known features may be omitted or simplified in order not to obscure the present invention.

Reference is now made to FIGS. **1-4**, depicting various views of a cutting tool **150** according to an embodiment of the present invention. The cutting tool **150** includes a tool holder body **152**, having two body side surfaces **155** and a peripheral surface **156** extending therebetween. A plurality of segment pockets **154** are formed in the peripheral surface **156** of the tool holder body **152**. The cutting tool **150** also includes a plurality of cutting tool segments **100**, each cutting tool segment **100** detachably retained in a respective segment pocket **154**. The cutting tool **150** is shown as a rotary cutting tool, having a central rotation axis B. When operating, the cutting tool **150** rotates about the central axis B against a work piece for cutting material off the work piece.

With particular reference to FIGS. **3-4**, each segment pocket **154** has an upper pocket surface **158** and an opposite lower pocket surface **160**. A pocket rear surface **178** extends between the upper pocket surface **158** and the lower pocket surface **160**. The upper pocket surface **158** has an upper clamping surface **162**, and the lower pocket surface **160** has two spaced apart lower clamping surfaces **168**, **170**.

The cutting tool segment **100** has a longitudinal segment axis A extending in a rearward to forward direction D_R, D_F. The cutting tool segment **100** includes an upper end **102** and a lower end **104**, located on opposite sides of the segment axis A. The lower end **104** has a lower surface **106** with two spaced apart lower abutment surfaces **108**, **110**. The cutting tool segment **100** has two segment side surface **107** and a segment

peripheral surface **109** extending therebetween. A segment rear surface **134** extends in the rear of the cutting tool segment **100** between the lower surface **106** and the back of the resilient retention arm **116**.

An insert retention portion **112** is formed in the upper end **102**, at a forward end **114** of the cutting tool segment **100**. A resilient retention arm **116** is formed in the upper end **102**, and has an upper abutment surface **118**. The retention arm **116** is rearwardly spaced apart from the insert retention portion **110**.

As depicted in FIGS. **3** and **4**, in a side view of the cutting tool segment **100**, the upper and lower abutment surfaces **118**, **108**, **110** are linear. In the side view of the cutting tool segment **100**, the upper abutment surface **118** lies along an upper line **11**, and the lower abutment surfaces **108**, **110** lie along a lower line **12**. In some embodiments, the upper line **11** and the lower line **12** may be parallel to one another, in some positions of the cutting tool **150** (for example, when the cutting tool segment **100** is mounted in the segment pocket **154**). It should be noted, that such upper and lower abutment surfaces **118**, **108**, **110** (i.e., linear in a side view) are easier to manufacture, for example, compared to abutment surfaces which are curved in a side view. Further, such abutment surfaces are easier for grinding, as compared to curved abutment surfaces. It would be appreciated that the upper and lower abutment surfaces **118**, **108**, **110** may be V-shaped surfaces, for a firm abutment between the cutting tool segment **100** and the segment pocket **154**. It is further noted that the lower abutment surfaces **108**, **110** may be two spaced apart sections of a single linear surface, i.e., the lower surface **106**.

In the cutting tool **150**, each of the at least one cutting tool segment **100** is detachably retained in a respective segment pocket **154**, such that the upper abutment surface **118** of the cutting tool segment **100** abuts the upper clamping surface **162** of the segment pocket **154**. Further, the lower abutment surfaces **108**, **110** of the cutting tool segment **100** are in firm abutment with the lower clamping surfaces **168**, **170** of the segment pocket **154**, respectively. When the cutting tool segment **100** is advanced rearwards into the segment pocket **154**, the retention arm **116** is resiliently forced toward the segment axis A. The movement of the retention arm **116** is possible due to a resilience gap **117** formed adjacent thereto. A firm friction fit is formed between the upper and lower abutment surfaces **118**, **108**, **110** of the cutting tool segment **100**, respectively with the upper and lower clamping surfaces **162**, **168**, **170** of the segment pocket **154**.

In each one of the cutting tool segments **100**, a cutting insert **122** is retained in the insert retention portion **112**. The insert retention portion **112** may include any arrangement for holding the cutting insert **122**. The cutting tool segment **100** shown in the figures of the present application, includes a friction fit resilient retention portion for holding the cutting insert **122** by a friction fit (i.e., without a fastening member as a screw and the like, such as seen in U.S. Pat. No. 7,163,361, whose contents are incorporated by reference). Thus, the insert retention portion **112** is devoid of a threaded bore for receiving a clamping screw or other clamp to retain the cutting insert. However, any other type of insert retention may be employed, for example, such that includes a fastening member, such as seen in U.S. Pat. No. 7,090,443, whose contents are incorporated by reference.

In any case, the resilient retention arm **116** is rearwardly spaced apart from the insert retention portion **112**. Thus, the forces applied on the cutting tool segment **100** due to its retention in the segment pocket **154**, do not contribute to, or interfere with, the forces applied due to the retention of the cutting insert **122** in the insert retention portion **112**. Therefore, it is possible to remove and mount the cutting insert **122** to the cutting tool segment **100** while the cutting tool segment **100** is mounted on the cutting tool body **152**.

Reference is further made to FIGS. **5-6**, depicting another embodiment of the present invention. In this embodiment, the cutting tool **150** includes the cutting tool body **152** and at least one cutting tool segment **140**. The cutting tool segment **140** is similar to the cutting tool segment **100**, however the lower surface **106** of the cutting tool segment **140** has a locking recess **124** formed between the lower abutment surfaces **108**, **110**. The locking recess **124** is indented from the lower surface **106** towards the segment axis A, and is adapted to partially receive a locking member **126**.

The lower pocket surface **160** of the segment pocket **154** has a pocket recess **166** formed between the lower clamping surfaces **168**, **170**. When the cutting tool segment **140** is located within the segment pocket **154**, the pocket recess **166** faces the locking recess **124** of the cutting tool segment **100**. The pocket recess **166** and the locking recess **124** thus form together a locking aperture **172**, adapted to receive the locking member **126** there through. The locking aperture **172** has an inner surface **176**. The locking member **126** may be a cam member for firmly locking the respective cutting tool segment **100** in its segment pocket **154**, when the cam member is rotated about a cam axis C, which is transverse to the segment axis A.

A portion of the cam member **126** has a portion contour **174** (e.g., a spiral contour or an oval contour), for interacting with a portion of the inner surface **176** of the locking aperture **172**, i.e., for simultaneously interacting with the pocket recess **166** and the locking recess **124**, when rotated about the cam axis C. When the cam member **126** is rotated about the cam axis C, the portion contour **174** thereof presses against respective portions of the walls of the locking recess **124** and the pocket recess **166**. This forms a firmer retention between the cutting tool segment **100** and the segment pocket **154**.

The cutting tool segment **100**, **140** may further have a segment key aperture **132**, opening out to at least one of the segment side surfaces **107**, and the holder body **152** has a holder key aperture **164**, opening out to at least one of the body side surfaces **155**. The segment and holder key apertures **132**, **164** are adapted to simultaneously receive respective prongs of an actuating key, which serves to advance the cutting tool segment **100**, **140** into and out of the segment pocket **154**. The actuating key is configured to advance the cutting tool segment **100**, **140** into the segment pocket **154**, when rotated in a first direction, and to extract the cutting tool segment **100**, **140**, when rotated in an opposite direction. If the second embodiment is employed (FIGS. **5-6**), the cutting tool segment **140** is advanced into the segment pocket **154**, and the locking member **126** is subsequently placed in the locking aperture **172** and then rotated about the cam axis C to fasten the cutting tool segment **100** in the segment pocket **154**.

The cutting tool segment **100**, **140** may further include a stopper portion **128** located at the forward end **114** thereof. The stopper portion **128** protrudes from the lower surface of the cutting tool segment **100**, **140**, in a direction away from the segment axis A. The stopper portion **128** has a substantially rearward-facing stopper surface **130** extending transversely to the segment axis A. Upon assembly of the cutting tool **150**, the cutting tool segment **100**, **140** is advanced into the respective segment pocket **154** until the stopper surface **130** abuts the peripheral surface **156** of the tool holder body **152**. The cutting tool segment **100**, **140** and the segment pocket **154** are formed such that there is no contact between the cutting tool segment **100**, **140** and the pocket rear surface **178** of the segment pocket **154**., i.e., the cutting tool segment

100, 140 is stopped before the segment rear surface 134 contacts the pocket rear surface 178.

The cutting tool 150 has a plurality of cutting tool segments 100, 140, and thus a plurality of cutting inserts 122, e.g., in the rotary cutting tool 150 as depicted in FIG. 1. To ensure an efficient cutting action, it is desirable to have the cutting edges of all of the cutting inserts 122 at a similar distance from the central axis B of the cutting tool 150. When all the cutting tool segments 100, 140 have stopper portions 128, they are stopped at the peripheral surface 156 of the tool holder body 152, at a similar distance from the central axis B. In this manner, the stopper portions 128 uniformly locate the cutting edges relative to the central axis B. It would be appreciated that it is easier to determine the location of the cutting edges by stopping the cutting tool segment 100, 140 against the peripheral surface 156, instead of stopping against the pocket rear surface 178, the location of which may vary between the various segment pockets 154.

Reference is now made to FIG. 7, depicting a portion of a cutting tool 150', according to a further embodiment of the present invention. The cutting tool 150' has a segment pocket 154'. According to this embodiment, a cutting tool segment 100' is similar to cutting tool segment 100, however, the cutting tool segment 100' is formed without the stopper portion 128.

Instead, when the cutting tool segment 100' is mounted in the segment pocket 154', the segment rear surface 134 of the cutting tool segment 100' abuts the pocket rear surface 178 of the segment pocket 154'. In this embodiment, the location of the cutting edge of the cutting insert 122 is determined by stopping the cutting tool segment 100' against the pocket rear surface 178 of the segment pocket 154'.

With further reference to FIG. 1, the cutting tool 150 is shown as a disc-shaped rotary slotting cutter with a plurality of segment pockets 154 and cutting tool segments 100. However, the cutting tool according to the present invention may be any other type of cutter, and may include at least one cutting tool segment with a cutting insert retained therein, for example, a turning cutter with a single segment pocket and a single cutting tool segment retained therein.

The cutting tool body 152 according to the present invention may be constructed of steel. The cutting tool segment 100, 140 may also be constructed of steel. The cutting insert 122 would be constructed of a hard material, suitable for cutting metals, such as cemented carbide and the like.

While the present invention has been described with reference to one or more specific embodiments, the description is intended to be illustrative as a whole and is not to be construed as limiting the invention to the embodiments shown. It is appreciated that various modifications may occur to those skilled in the art that, while not specifically shown herein, are nevertheless within the scope of the invention.

What is claimed is:

1. A cutting tool segment (100, 140, 100') having a longitudinal segment axis (A) extending in a rearward to forward direction (D_R, D_F), and comprising:

an upper end (102) and a lower end (104), located on opposite sides of the segment axis (A), the lower end (104) having two spaced apart lower abutment surfaces (108, 110),

an insert retention portion (112) formed in the upper end (102), at a forward end (114) of the cutting tool segment (100, 140, 100'); and

a resilient retention arm (116) formed in the upper end (102), rearwardly spaced apart from the insert retention portion (112) by a resilience gap (117), the retention arm (116) having an upper abutment surface (118);

wherein in a side view of the cutting tool segment (100, 140, 100'), the upper and lower abutment surfaces (118, 108, 110) are linear.

2. The cutting tool segment (100, 140, 100') according to claim 1, wherein in a side view of the cutting tool segment (100, 140, 100'), the upper abutment surface (118) and the lower abutment surfaces (108, 110) are parallel to one another.

3. The cutting tool segment (100, 140, 100') according to claim 1, wherein the insert retention portion (112) includes an insert pocket (120) adapted to receive a cutting insert (122) and hold the cutting insert (122) by a friction fit.

4. The cutting tool segment (100) according to claim 1, wherein the lower surface (106) further has a locking recess (124) located between the lower abutment surfaces (108, 110), the locking recess (124) adapted to partially receive a locking member (126).

5. The cutting tool segment (100, 140) according to claim 1, further comprising a stopper portion (128) located at the forward end (114) of the cutting tool segment (100, 140), the stopper portion (128) having a rearward facing stopper surface (130) extending transversely to the segment axis (A), the stopper portion (128) extending in a direction away from the segment axis (A) at the cutting tool segment's lower end (104).

6. A cutting tool (150, 150'), comprising:

a tool holder body (152) having at least one segment pocket (154, 154') formed at a peripheral surface (156) thereof, and

at least one cutting tool segment (100, 140, 100') according to claim 1, retained in the at least one segment pocket (154, 154').

7. The cutting tool (150, 150') according to claim 6, wherein:

in the tool holder body (152), each segment pocket (154, 154') has an upper pocket surface (158) and an opposite lower pocket surface (160), the upper pocket surface (158) having an upper clamping surface (162) and the lower pocket surface (160) having two spaced apart lower clamping surfaces (168, 170);

the upper abutment surface (118) of the cutting tool segment (100, 140, 100') abuts the upper clamping surface (162) of the segment pocket (154), the lower abutment surfaces (108, 110) of the cutting tool segment (100, 140, 100') abuts the lower clamping surfaces (168, 170) of the segment pocket (154, 154'), and the retention arm (116) is resiliently forced toward the segment axis (A); and

at least one cutting insert (122) is retained in the insert retention portion (112) of the at least one cutting tool segment (100, 140, 100').

8. The cutting tool (150) according to claim 7, wherein:

the at least one cutting tool segment (100, 140) further comprises a stopper portion (128) located at the forward end (114) of the at least one cutting tool segment (100, 140), the stopper portion (128) having a rearward facing stopper surface (130) extending transversely to the segment axis (A); and

the stopper surface (130) abuts the peripheral surface (156) of the tool holder body (152).

9. The cutting tool (150) according to claim 7, wherein:

the lower surface (106) of the at least one cutting tool segment (100) further has a locking recess (124) located between the lower abutment surfaces (108, 110),

the lower pocket surface (160) of the at least one segment pocket (154) has a pocket recess (166) formed between the lower clamping surfaces (168, 170), the pocket

recess (**166**) facing the locking recess (**124**) and forming therewith a locking aperture (**172**) adapted to receive a locking member (**126**) therethrough.

10. The cutting tool (**150**) according to claim **9**, wherein the locking member (**126**) is a cam member for firmly locking the respective cutting tool segment (**100**) in its segment pocket (**154**), when the cam member is rotated about a cam axis (C) transverse to the segment axis (A).

11. The cutting tool (**150**) according to claim **10**, wherein the cam member (**126**) has a portion contour (**174**) for interacting with an inner surface (**176**) of the locking aperture (**172**), when the cam member is rotated about the cam axis (C).

12. The cutting tool (**150**, **150'**) according to claim **7**, wherein the cutting tool segment (**100**, **140**, **100'**) has a segment key aperture (**132**) formed therein, and the holder body (**152**) has a holder key aperture (**164**) formed therein, the segment and holder key apertures (**132**, **164**) being adapted to simultaneously receive respective prongs of an actuating key.

13. The cutting tool (**150**, **150'**) according to claim **7**, wherein the cutting insert is retained in the insert retention portion (**112**) by a friction fit.

14. The cutting tool (**150**, **150'**) according to claim **7**, wherein the cutting insert only contacts the cutting tool segment's insert retention portion (**112**).

15. A cutting tool segment (**100**, **140**, **100'**) having a longitudinal segment axis (A) extending in a rearward to forward direction (D_R, D_F), and comprising:

an upper end (**102**) and a lower end (**104**), located on opposite sides of the segment axis (A), the lower end (**104**) having two spaced apart lower abutment surfaces (**108**, **110**),

an insert retention portion (**112**) formed in the upper end (**102**), at a forward end (**114**) of the cutting tool segment (**100**, **140**, **100'**); and

a resilient retention arm (**116**) formed in the upper end (**102**), the retention arm having an upper abutment surface (**118**), an entirety of the resilient retention arm (**116**) being located rearwardly of the insert retention portion (**112**) and spaced apart therefrom by a resilience gap (**117**);

wherein in a side view of the cutting tool segment (**100**, **140**, **100'**), the upper and lower abutment surfaces (**118**, **108**, **110**) are linear.

* * * * *